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- 26 -

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CLAIMS

1. An engine (400) for use with a load, said engine comprising:

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a compressor (428) adapted to receive power and, upon receiving power, to: periodically define a chamber; fill the chamber with ambient air; and carry out a pressurization process wherein the chamber volume is decreased to produce pressurized air,

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a radiator (414) adapted to receive pressurized air from the compressor (428) and to cool pressurized air so received,

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combuster means (426) for receiving fuel and combusting same in a combustion process with the pressurized air to produce primary exhaust products,

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a positive displacement air motor (408) adapted to be driven by the primary exhaust products to produce power and secondary exhaust products,

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a positive displacement gas expander (410) for receiving the secondary exhaust products and expanding same substantially adiabatically to produce tertiary exhaust products and power, and

power transfer means (314) for directing power produced by the air motor (408) and the gas expander (410) in use to drive the compressor (428) and the load,

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ART 34 AMDT

- 27 -

wherein:

5 the combuster means (426) is adapted to receive varying amounts of fuel, thereby to cause the power transfer means (314) to drive the load with varying amounts of power in use; and

10 the compressor (428) is adapted to, during the pressurization process, release air from the chamber for said combustion in a manner such that the pressure in the chamber during the pressurization process and the pressure of the primary exhaust products driving the air motor (408) is at a substantially constant level at steady state conditions, said level adjusting spontaneously to the load being driven by the power.

- 15 2. An engine (400) according to claim 1, wherein the compressor (428) is a rotary compressor.
3. An engine (400) according to claim 1, wherein the combuster means (426) comprises a tubular combuster.
- 20 4. An engine (400) according to claim 1, wherein the air motor (408) is a rotary air motor.
5. An engine (400) according to claim 1, wherein the gas expander (410) is a rotary gas expander.
- 25 6. An engine (400) according to claim 1, wherein the power transfer means (314) comprises a shaft operatively coupled to each of the compressor (428), the air motor (408) and the gas expander (410).

ART 34 AMDT

AMENDED SHEET

- 28 -

7. An engine (400) according to claim 1, further comprising a reservoir adapted to receive pressurized air from the compressor (428) and wherein the combustor means (426) receives air for said combustion from the reservoir.
8. An engine (400) according to claim 1, wherein the radiator (414) also serves as a reservoir adapted to receive pressurized air from the compressor (428) and wherein the combustor means (426) receives air for said combustion from the radiator (414).
9. An engine (400) according to claim 2, wherein the radiator (414) also serves as a reservoir adapted to receive pressurized air from the compressor (428) and wherein the combustor means (426) receives air for said combustion from the radiator (414).
10. An engine (400) according to claim 1, wherein the expansion ratio defined by the expander (410) is larger than the compression ratio defined by the compressor (428).
11. An internal combustion engine (400) for use with a load, said engine (400) comprising:
- a rotary compressor (428) adapted to receive power and, upon receiving power, to: periodically define a chamber; fill the chamber with ambient air; and carry out a pressurization process wherein the chamber volume is decreased to produce pressurized air,
- a radiator (414) coupled to the compressor (428) to receive the pressurized air and adapted to cool said pressurized air and to function as a reservoir therefor,

ART 31 AMDT

- 29 -

a first backflow preventer (416) and a second backflow preventer (417), each coupled to the radiator (414) to permit unidirectional flow therefrom;

5 a pressure tank (418) coupled to the first backflow preventer (416) to receive pressurized air from the radiator (414);

a valve (420) coupled to the pressure tank (418) to permit the selective release of pressurized air from the pressure tank (418);

10

a tubular combustor (426) coupled to the valve (420) and to the second backflow preventer (417) to receive pressurized air from the radiator (414) and pressurized air selectively released from the pressure tank (418) and adapted to receive fuel and combust same in a combustion process with the pressurized air so received to produce primary exhaust products,

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a positive displacement rotary air motor (408) coupled to the combustor (426) so as to be driven by the primary exhaust products to produce power and secondary exhaust products,

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a positive displacement rotary gas expander (410) coupled to the air motor (408) for receiving the secondary exhaust products and expanding same substantially adiabatically to produce tertiary exhaust products and power, and

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a shaft (314) operatively coupled to each of the compressor (428), the air motor (408) and the gas expander (410) for directing power produced by the air motor (408) and the gas expander (410) in use to drive the compressor (428) and the load,

ART 31 AMEND

AMENDED SHEET

- 30 -

wherein:

5 the combustor means (426) is adapted to receive varying amounts of fuel, thereby to cause the shaft (314) to drive the load with varying amounts of power in use; and

10 the compressor (428) is adapted to, during the pressurization process, release air from the chamber for said combustion in a manner such that the maximum pressure in the chamber during the pressurization process and the pressure of the primary exhaust products driving the air motor (408) is substantially constant at steady state conditions, said constant being a function of the power driving the load.

15 12. An engine (400) according to claim 1, wherein the expansion ratio defined by the expander (410) is larger than the compression ratio defined by the compressor (428).

20 13. An engine (400) according to claim 1, wherein the compressor (428) is a three stage compressor.

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